REMARKS

Reconsideration and allowance in view of the foregoing amendment and the following remarks are respectfully requested.

Claims 1-11 are now pending.

Claim 1 was rejected under 35 USC 112, second paragraph, as being indefinite. Claim 1 has been reviewed and revised above responsive to the Examiner's formal objection. The amendments to claim 1 are made solely in response to the Examiner's formal rejection and are not made in response to any prior art rejection of that claim.

Claim 1 was rejected under 35 USC 102(b) as anticipated by Fujii et al. Applicant respectfully traverses this rejection.

Claim 1 characterizes the gas sensing element of the invention as including a porous electrode protecting layer covering the measured gas side electrode, that has a limit current density in a range from 0.04 mA/mm^2 to 0.15 mA/mm^2 on a unit area of the reference gas side electrode under the condition where the oxygen concentration in the measured gas is 0.1%, a measurement temperature and an element surface temperature at the measured gas side of a sensing portion are not less than 600°C and a voltage applied between the measured gas side electrode and the reference gas side electrode is 0.5V.

Anticipation under Section 102 of the Patent Act requires that a prior art reference disclose every claim element of the claimed invention. See, e.g., Orthokinetics, Inc. v. Safety Travel Chairs, Inc., 806 F.2d 1565, 1574 (Fed. Cir. 1986). While other references may be used to interpret an allegedly anticipating reference, anticipation must be found in a single reference. See, e.g., Studiengesellschaft Kohle, G.m.b.H. v. Dart Indus., Inc., 726 F.2d 724, 726-27 (Fed. Cir. 1984). The absence of any element of the claim from the cited reference negates anticipation. See, e.g., Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 715 (Fed. Cir. 1984).

Anticipation is not shown even if the differences between the claims and the prior art reference are insubstantial and the missing elements could be supplied by the knowledge of one skilled in the art. See, e.g., Structural Rubber Prods., 749 F.2d at 716-17.

The Examiner characterizes Fujii as teaching a protective layer 11 having a thickness of 100 to 300 microns and an average pore size diameter of 0.01 to 0.3 microns. The Examiner then summarily concludes that because this combination of pore diameter and thickness overlap the layer thickness range and pore diameter range that provide the gas permeation rates applicant has characterized as providing the claimed limit current density, Fujii anticipates the claimed limit current density. Applicant respectfully disagrees with the Examiner's conclusions regarding the Fujii disclosure.

In an exemplary embodiment of the invention, a gas sensing element is formed by integrally sintering the solid electrolytic substrate and the electrode protecting layer, as disclosed in particular at page 9, line 19 - page 10, line 8. In contrast, Fujii discloses a gas sensing element of the type that requires dipping a sintered solid electrolyte body in a slurry to form a protecting layer, as disclosed for example at column 12, lines 38-60 of Fujii, more specifically, lines 56-60. Because the manufacturing method for the protecting layer of Fujii differs from that of the invention, the pore structure of the manufactured protecting layer will be different in the invention and in Fujii. Accordingly, it is inappropriate to summarily conclude that a thickness range for the protective layer 11 of 100 to 300 microns and an average pore size diameter of 0.01 to 0.3 microns as disclosed in Fujii will necessarily result in the limit current density recited in applicant's claim 1. On the contrary, due to the manufacturing process of Fujii, the disclosed thickness and pore diameter of Fujii do not inherently nor obviously mean that the porous electrode protecting layer of Fujii has a limit current density as recited in applicant's claim 1.

It is noted that new claims 2-4 have been added above which specify the integration and sintering of the solid electrolytic substrate and the electrode protecting layer in accordance with a preferred embodiment of the invention. It is respectfully submitted, however, that such limitations are not required to distinguish the invention from Fujii. Indeed, the fact that pore diameter and thickness ranges disclosed by Fujii are similar to pore diameters and thicknesses that yield the claimed limit current density in the applicant's disclosed assembly does not *ipso facto* mean that Nakano's assembly would also have the claimed limit current density or otherwise anticipate the invention of independent claim 1.

It is further respectfully submitted that the inventors focused on ensuring excellent response and anti-poisoning endurance in developing the gas sensing element embodying the invention. With this focus, the inventors of the present invention conducted extensive and unique research and development through various demonstrations and evaluations to optimize the limit current density. Such a characteristic focus and development is not taught or suggested by the applied art so that the claimed limit current density would not obviously result from routine experimentation based on the teachings of the prior art.

It is also submitted that the limits of the limit current density set forth in claim 1 have clearly been established by the disclosure as being material and not an arbitrary range. In this regard, as discussed for example on page 4, the inventors discovered that when the limit current density is less than 0.04 mA/mm^2, the porous electrode protecting layer may be clogged or blocked by poisonous substances contained in the measuring gas so that measured gas cannot pass through the protecting layer and the response of the gas sensing electrode will deteriorate. On the other hand, if the limit current density is larger than 0.15 mA/mm^2, the poisonous substances contained in the measured gas can usually pass through the electrode protecting layer and as a result the electrode will be clogged or blocked by the poisonous substances so that the sensor output may not be produced.

According to the present invention, the electrode protecting layer is provided on the measured gas side electrode in such a manner that the limit current density of the oxygen ion current is in the above-described range under the above-described conditions. Thus, it is possible to obtain a gas sensing element capable of preventing the protecting layer from being clogged or blocked by the poisonous substances contained in the measured gas and accordingly have excellent endurance. Furthermore, the measured gas can smoothly flow across the electrode protecting layer so that even if the oxygen concentration in the measured gas changes rapidly, the gas sensing element can product a sensor output varying quickly according to the oxygen concentration change.

It is respectfully submitted that the Examiner has not established a *prima facie* case that the invention recited in claim 1 is anticipated by or obvious from Fujii because, the Examiner has <u>not</u> established that Fujii obviously or inherently provides a porous electrode protecting layer having a limit current density in the range recited in applicant's claim 1, under the conditions recited in applicant's claim 1. Indeed, because of the different manufacturing process used by Fujii, the thickness and pore diameter values he discloses do not inherently yield the claimed limit current density. Reconsideration and withdrawal of the rejection of claim 1 over Fujii et al is respectfully requested.

Claim 1 was also rejected under 35 USC 102(b) as anticipated by Nakano et al. Applicant respectfully traverses this rejection.

The Examiner characterizes Nakano as teaching a protective layer having a thickness of 5 to 300 microns with an average pore size diameter of up to 2000 Angstroms. The Examiner then summarily concludes that since this combination of pore diameters and thickness allegedly overlaps the layer thickness range and pore diameter range providing the gas permeation rates applicants has stated, Nakano anticipates the claimed limit current density. Applicant respectfully disagrees. Indeed,

the fact that pore diameter and thickness ranges disclosed by Nakano are similar to pore diameters and thicknesses that yield the claimed limit current density in the applicant's disclosed assembly does not *ipso facto* mean that Nakano's assembly would also have the claimed limit current density or otherwise anticipate the invention of independent claim 1. In this regard, the gas sensing element of the present invention differs from the Nakano's device in that no layer is formed on the outer side of the electrode protective layer with respect to the solid electrolytic substrate. On the other hand, Nakano discloses in Figure 1 a gas shielding layer is formed on the outer side of the electrode protective layer with respect to the solid electrolytic substance. Due to this structural difference, the length of a gas permeation path in the protecting layer is apparently different as between the present invention and Nakano. Accordingly, it is inappropriate for the Examiner to summarily conclude that the thickness of 5 to 300 microns and average pore size diameter of up to 2000 Angstroms necessarily means that Nakano anticipates the elements of applicant's independent claim 1. On the contrary, no such conclusion can properly be drawn from Nakano disclosure because of the different structure provided by Nakano. It is therefore respectfully submitted that Nakano cannot properly be said to anticipate or render obvious the invention of applicant's claim 1.

Thus, because the cited reference provides a gas shielding layer, the Examiner cannot properly conclude that the cited reference anticipates a limit current density as recited in applicant's independent claim 1 based solely on the thickness and pore size diameters disclosed in the cited reference.

In view of the foregoing, reconsideration and withdrawal of the rejection based on Nakano are respectfully requested.

Claim 1 was also rejected under 35 USC 103(a) as unpatentable over Kato et al in view of Suzuki et al. Applicant respectfully traverses this rejection.

In order to prove obviousness, a challenger must present prior art references which disclose the claimed subject matter of the patent/application in question. If separate prior art references each disclose separate elements of a claim, the challenger must also show some teaching, suggestion, or incentive in the prior art that would have led one of ordinary skill in the art to make the claimed combination. See, e.g., Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297 n.24, 304-05 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986). In determining obviousness, there must be some reason other than hindsight for selectively combining the prior art references to render the claimed invention obvious. See, e.g., Interconnect Planning Corp. v. Feil, 774 F.2d 1132, 1143 (Fed. Cir. 1985).

In rejecting claim 1, the Examiner characterizes Kato as setting forth a permeability that responds on the claimed limit current density. Applicant respectfully disagrees. In this regard, it is respectfully noted that the gas sensing element disclosed and claimed in the present application differs from the Kato device in that in an exemplary embodiment of the invention only one protective layer is formed on the solid electrolytic substrate. In contrast, Kato discloses in Figure 1 a double electrode protective layer. Due to these structural differences, it is inappropriate for the Examiner to rely solely on the gas permeability of the second porous protective layer disclosed in Kato as allegedly teaching applicant's claimed invention. Accordingly, it is inappropriate to conclude that Kato's stated permeability is evidence that Kato anticipates or renders of the limit current density of the invention as defined by applicant's claim 1. The secondary reference to Suzuki discloses nothing regarding the limit current density. Therefore, a combination of Kato and Suzuki would still not anticipate nor render obvious the claimed invention.

Thus, because Kato's teachings are limited to a double electrode protective layer, Kato cannot properly be said to clearly anticipate, in the combination claimed by applicant, a porous electrode protective layer having a limit current density as claimed by applicant.

As is apparent from the foregoing, none of the cited references disclose the object of the present invention, that is assuring excellent response and anti-poisoning endurance, nor teach or suggest the limit current range of an electrode protecting layer, as claimed, to achieve that object.

Attached is a Form PTO-1449 listing the enclosed documents.

I hereby certify that each enclosed document listed on the herewith Form PTO-1449 was first cited in the attached EP Search Report, dated November 5, 2003, issued in a counterpart foreign application not more than three months ago.

See the degree of relevancy and the particular passages cited for each document in that Search Report.

This Information Disclosure Statement is intended to be in full compliance with the rules, but should the Examiner find any part of its required content to have been omitted, prompt notice to that effect is earnestly solicited, along with additional time under Rule 97(f), to enable Applicant to comply fully.

Consideration of the foregoing and enclosures plus the return of a copy of the herewith Form PTO-1449 with the Examiner's initials in the left column per MPEP 609 is earnestly solicited.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect is earnestly solicited.

Respectfully submitted,

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